

IN THE CLAIMS

1. – 3. (Canceled)

4. (Previously Presented) The dry sprinkler of claim 51, the first means comprising a locator and the second means further comprising a member that contacts at least one of the locator and the metallic disc annulus to translate the face of the metallic disc annulus to a side of the longitudinal axis when the locator moves from the first position toward the second position.

5. (Canceled)

6. (Previously Presented) The dry sprinkler of claim 51, the first means comprising a locator and the second means further comprising a projection extending from the inner surface of the structure, the projection having a free end located in the passageway, the free end contacting at least one of the locator and metallic disc annulus to translate the face of the annulus to a side of the longitudinal axis when the locator moves from the first position towards the second position so as to permit a flow of fluid through the passageway between the inlet and outlet.

7. (Previously Presented) The dry sprinkler of claim 51, the first means comprising a locator and the second means further comprising a member extending across the passageway and connecting to the inner surface of the structure at a plurality of points of the inner surface, the member contacting at least one of the locator, metallic disc annulus, and support member to translate the face of the annulus to a side of the longitudinal axis.

8. - 10. (Canceled)

11. (Previously Presented) The dry sprinkler of claim 51, wherein the first means comprises a closure body having a disc support surface supporting the metallic disc annulus, and wherein the second means further comprises a projection extending from the inner surface of the structure towards the longitudinal axis in the passageway, the projection having a free end located in the passageway, the free end contacting the metallic disc annulus to separate the metallic disc annulus from the closure body such that the closure body falls in the passage

proximate the outlet when the first means moves from the first position towards the second position.

12. – 26. (Canceled)

27. (Previously Presented) The dry sprinkler of claim 152, wherein the inlet comprises a generally cylindrical outer surface having one of $\frac{3}{4}$ inch, 1 inch, 1.25 inch NPT and 7-1 ISO threads formed thereon.

28. (Previously presented) The dry sprinkler of claim 27, wherein the inlet further comprises a planar annulus surface and a truncated conical surface facing the longitudinal axis adjacent the planar annulus surface, the truncated conical surface extending at an angle of about thirty degree with respect to the longitudinal axis.

29. (Previously Presented) The dry sprinkler of claim 152, wherein the inlet comprises an entrance surface having a first end and a second end disposed along and surrounding the longitudinal axis and a seat surface adjacent the second end of the entrance surface.

30. (Original) The dry sprinkler of claim 29, wherein the entrance surface comprise a convex surface surrounding the longitudinal axis and the seat surface comprises a planar annulus surface surrounding the longitudinal axis.

31. (Previously presented) The dry sprinkler of claim 30, wherein the inlet further comprises at least a first oblique surface adjacent the planar annulus surface.

32. (Previously presented) The dry sprinkler of claim 31, wherein the inlet further comprises at least a second surface oblique to the longitudinal axis surface adjacent the planar annulus surface.

33. (Original) The dry sprinkler of claim 32, wherein the face of the disc annulus comprises a generally planar surface contacting the planar annulus surface when the locator is proximate the first position.

34. (Original) The dry sprinkler of claim 33, wherein the face of the disc annulus comprises a truncated conical surface extending towards the planar annulus surface when the locator is proximate the second position.

35. (Original) The dry sprinkler of claim 34, wherein the locator comprises a seat that supports the metallic disc annulus.

36. (Original) The dry sprinkler of claim 35, wherein the locator comprises a closure body coupled to a yoke, the closure body having a top portion and a base portion, the top portion having at least one surface providing a seat for the metallic disc annulus, the yoke having a first wall portion and a second wall portion symmetric about a yoke axis, the first wall portion and the second wall portion being coupled to the surface of the base portion of the closure body.

37. (Original) The dry sprinkler of claim 36, wherein the top portion comprises a surface defining a blind hole.

38. (Original) The dry sprinkler of claim 37, wherein the structure includes a first tubular portion connected to a second tubular portion, and a third tubular portion spaced from the first tubular portion and connected to the second tubular portion, the first tubular portion having a first set of threads formed on one of inner and outer surfaces of the first tubular portion, the second tubular portion having second and third sets of threads, the second set of threads formed proximate a first end of the second tubular portion on one of outer and inner surfaces, the third set of threads formed proximate a second end of the second tubular portion on one of inner and outer surfaces, and a fourth set of threads formed on one of outer and inner surfaces of the third tubular portion; and wherein the first set of threads engages the second set of threads, and the third set of threads engages the fourth set of threads.

39. (Original) The dry sprinkler of claim 38, wherein the structure comprises a length from the inlet to the outlet between two to fifty inches.

40. (Previously Presented) The dry sprinkler of claim 39, wherein the structure further comprises a coil spring disposed about the longitudinal axis within the tubular outer structure proximate the inlet, the coil biasing the locator along the longitudinal axis towards the outlet.

41. (Previously Presented) The dry sprinkler of claim 40, wherein the structure comprises a fluid tube connected to a guide tube, each of the fluid and guide tube comprises an outer generally cylindrical wall surface spaced from an inner generally cylindrical wall surface along and about the longitudinal axis so as to define a fluid tube passage, the fluid tube and guide tube being surrounded by the second tubular portion.

42. (Previously Presented) The dry sprinkler of claim 41, further comprising a trigger assembly and wherein the outer generally cylindrical wall surface of the guide tube comprises a diameter between diametrical wall surfaces of a magnitude less than the diameter between diametrical wall surfaces of the inner generally cylindrical wall surface of the fluid tube, the guide tube comprises a first guide tube portion and a second guide tube portion, the first guide tube portion being fixed to another end of the fluid tube, the second guide tube portion being connected to the trigger assembly.

43. (Original) The dry sprinkler of claim 42, wherein the trigger assembly comprises a trigger seat, a trigger and a retention member disposed between the fluid tube and the fluid deflecting structure.

44. (Previously Presented) The dry sprinkler of claim 38, wherein the third tubular portion comprises at least one frame arm connected to the third tubular portion.

45. (Original) The dry sprinkler of claim 44, wherein the trigger seat comprises a generally cylindrical plug having a first plug portion extending in the outlet and second plug portion forming a nub connected to the trigger.

46. (Original) The dry sprinkler of claim 45, wherein the retention member comprises an elongate member fixed to the fluid deflecting structure and coupled to the at least one frame arm.

47. (Original) The dry sprinkler of claim 46, wherein the trigger comprises a temperature responsive trigger being retained between the seat trigger and the retention member, the temperature responsive trigger being operative to: (1) maintain the inner tubular assembly proximate the first position over the first range of temperatures between minus 60 degrees Fahrenheit to a temperature just below a rated temperature of the trigger; and (2) permit the inner tubular assembly to move along the longitudinal axis to the second position over a second range of temperatures greater than or equal to the rated temperature of the trigger.

48. (Previously Presented) The dry sprinkler of claim 152, wherein the pressure of the flow fed into the inlet comprises a plurality of start pressures between 0 and 175 psig.

49. (Original) The dry sprinkler of claim 48, wherein the plurality of start pressures comprises one of 20 psig and 100 psig.

50. (Original) The dry sprinkler of claim 48, wherein the K-factor comprises a K-factor of at least one of about 5.6, 8.0, 11.2, 14.0 and 16.8.

51. (Previously Presented) A dry sprinkler comprising:

- a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

- a fluid deflecting structure proximate the outlet;

- a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter;

- a support member for the metallic disc annulus;

- first means for translating the metallic disc annulus along the longitudinal axis between a first position and a second position; and

- second means for repositioning the central axis of the face skewed to the longitudinal axis within the passageway between the first position and the second position, the second means being located between the first and the second position and longitudinally spaced

from the support member for the metallic disc annulus when the annulus is in either one of the first and second positions so that a flow of fluid in gallons per minute from the outlet of the structure is at least 95 percent of the rated K-factor multiplied by the square root of the pressure of the flow of fluid fed into the inlet of the structure in pounds per square inch gauge.

52. - 54. (Canceled)

55. (Original) A dry sprinkler comprising: a tubular outer structure defining a passageway extending along a longitudinal axis between an inlet and an outlet;

a tubular inner assembly disposed within the tubular outer structure and movable along the longitudinal axis in the passageway between a first position and a second position, the tubular inner assembly including:

a multi-legged yoke, the multi-legged yoke having a first yoke support end and a second yoke support end, the first yoke support end including at least one elongate member, the second yoke support end including at least two support legs extending from the at least one elongate member; and

a fluid tube supporting the multi-legged yoke at one end of the fluid tube;

a closure assembly supported by the at least one elongate member of the first yoke support end, the closure assembly including a surface occluding a flow of fluid in the passageway when the tubular inner assembly is proximate the first position;

a projection extending from the tubular outer structure, the projection having a free end located in the passageway, the free end contacting the closure assembly to translate the surface to a side of the longitudinal axis when the inner tubular assembly moves from the first position towards the second position so as to permit a flow of fluid through the passageway between the inlet and outlet;

a temperature responsive trigger assembly proximate the outlet of the tubular outer structure; and

a fluid deflecting structure proximate the outlet of the tubular outer structure.

56. (Previously Presented) The dry sprinkler of claim 55, wherein the tubular outer structure includes a first tubular portion comprising an inlet having an inlet outer surface and inlet inner

surface cincturing a sleeve, the sleeve being connected to the projection and a free end of the projection comprises a unitary portion of the sleeve extending generally transverse to the longitudinal axis.

57. (Original) The dry sprinkler of claim 56, wherein the sleeve comprises a projection opening extending generally transverse to the longitudinal axis through a wall of the sleeve, the projection being disposed in the projection opening of the sleeve so as to extend generally transverse to the longitudinal axis.

58. – 135. (Canceled)

136. (Previously Presented) A dry sprinkler comprising:

- a structure having an inner surface to define a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

- a fluid deflecting structure proximate the outlet;

- a member having a first surface secured to the inner surface of the passageway and a second surface disposed in the passageway;

- a metallic disc annulus having a first position substantially axially aligned with the longitudinal axis and axially spaced from the member for occluding the passageway, the annulus having a second position skewed from the longitudinal axis so that a fluid can flow from the outlet, the annulus contacting the second surface of the member as the annulus is displaced from the first position to the second position; and

- a locator being movable along the longitudinal axis to displace the annulus from the first position to the second position.

137. (Canceled)

138. (Previously Presented) A dry sprinkler comprising:

a structure having an inner surface to define a passageway extending along a longitudinal axis between an inlet and an outlet;

a fluid deflecting structure proximate the outlet;

a member having a first surface engaged with the inner surface of the passageway and a second surface disposed in the passageway;

a closure assembly including a surface, the closure assembly having a first position substantially aligned with the longitudinal axis such that the member occludes communication between the inlet and the outlet, the closure assembly having a second position skewed from the longitudinal axis such that the inlet is in communication with the outlet, at least a portion of the closure assembly engaging the second surface of the member to move from the first position to the second position and the surface of the closure assembly being axially spaced from the second surface of the member in at least one of the first and second positions; and

a yoke movable along the longitudinal axis and engaging at least a portion of the closure assembly in at least one of the first and second positions.

139. (Previously Presented) The dry sprinkler of claim 138 wherein the yoke supports the closure assembly in the first position.

140. (Previously Presented) The dry sprinkler of claim 138, wherein the yoke engages the surface of the closure assembly.

141. (Previously Presented) The dry sprinkler of claim 138, wherein the yoke includes a tip for engaging the at least portion of the closure assembly.

142. (Previously Presented) The dry sprinkler of claim 141, wherein the tip tapers narrowly along the longitudinal axis in the direction from the outlet to the inlet.

143. (Previously Presented) The dry sprinkler of claim 138, wherein the yoke has a plurality of legs disposed about the longitudinal axis.

144. (Previously Presented) The dry sprinkler of claim 143, wherein the yoke has two pairs of legs disposed about the longitudinal axis.

145. (Previously Presented) The dry sprinkler of claim 138, wherein the member engages a recess along the inner surface of the structure.

146. (Previously presented) The dry sprinkler of claim 145, wherein the member engages the recess with an interference fit.

147. (Previously Presented) The dry sprinkler of claim 138, wherein the member is welded to the inner surface of the structure.

148. (Previously Presented) The dry sprinkler of claim 138, wherein the member defines an elongated axis, the elongated axis being disposed in a plane substantially perpendicular to the longitudinal axis.

149. (Previously Presented) The dry sprinkler of claim 138, wherein the member has a first end and a second end, the second surface being located between the first and second end.

150. (Previously Presented) The dry sprinkler of claim 138, wherein the member is substantially circular in cross-section.

151. (Previously Presented) The dry sprinkler of claim 138, wherein the structure has a rated K-factor and wherein when the closure assembly is in the second position, a flow of fluid in gallons per minute from the outlet of the structure is at least 95 percent of the rated K-factor multiplied by the square root of the pressure of the flow of fluid into the inlet of the structure in pounds per square inch gauge.

152. (Previously Presented) A dry sprinkler comprising:

- a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

- a fluid deflecting structure proximate the outlet;

- a locator movable along the longitudinal axis between a first position and a second position;

a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter, the outer perimeter contacting the structure so that the face occludes a flow of fluid through the passageway when the locator is proximate the first position, the metallic disc annulus being arranged with the central axis of the face being skewed from the longitudinal axis within the passageway when the locator is proximate the second position so that a flow of fluid in gallons per minute from the outlet of the structure is at least 95 percent of the rated K-factor multiplied by the square root of the pressure of the flow of fluid fed into the inlet of the structure in pounds per square inch gauge; and

a member that contacts the metallic disc annulus to translate the face of the metallic disc annulus to a side of the longitudinal axis when the locator moves from the first position toward the second position.

153. (Previously Presented) A dry sprinkler comprising:

a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

a fluid deflecting structure proximate the outlet;

a locator movable along the longitudinal axis between a first position and a second position;

a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter, the outer perimeter contacting the structure so that the face occludes a flow of fluid through the passageway when the locator is proximate the first position, the metallic disc annulus being arranged with the central axis of the face being skewed from the longitudinal axis within the passageway when the locator is proximate the second position so that a flow of fluid in gallons per minute from the outlet of the structure is at least 95 percent of the rated K-factor multiplied by the square root of the pressure of the flow of fluid fed into the inlet of the structure in pounds per square inch gauge; and

a projection extending from the inner surface of the structure, the projection having a free end located in the passageway, the free end contacting the metallic disc annulus to translate

the face of the annulus to a side of the longitudinal axis when the locator moves from the first position towards the second position so as to permit a flow of fluid through the passageway between the inlet and outlet.

154. (New) A dry sprinkler comprising:

- a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

- a fluid deflecting structure proximate the outlet;

- a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter;

- a support member for the metallic disc annulus;

- first means for translating the metallic disc annulus along the longitudinal axis between a first position and a second position; and

- second means for repositioning the central axis of the face skewed to the longitudinal axis within the passageway between the first position and the second position, the second means being located between the first and the second position and longitudinally spaced from the support member for the metallic disc annulus when the annulus is in either one of the first and second positions.

155. (New) A dry sprinkler comprising:

- a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

- a fluid deflecting structure proximate the outlet;

- a locator movable along the longitudinal axis between a first position and a second position;

a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter, the outer perimeter contacting the structure so that the face occludes a flow of fluid through the passageway when the locator is proximate the first position, the metallic disc annulus being arranged with the central axis of the face being skewed from the longitudinal axis within the passageway when the locator is proximate the second position; and

a member that contacts the metallic disc annulus to translate the face of the metallic disc annulus to a side of the longitudinal axis when the locator moves from the first position toward the second position.

156. (New) A dry sprinkler comprising:

a structure defining a passageway extending along a longitudinal axis between an inlet and an outlet, the structure having a rated K-factor defining an expected flow of fluid in gallons per minute from the outlet divided by the square root of the pressure of the flow of fluid fed into the inlet of the passageway in pounds per square inch gauge;

a fluid deflecting structure proximate the outlet;

a locator movable along the longitudinal axis between a first position and a second position;

a metallic disc annulus having a face disposed about a central axis between an inner perimeter and an outer perimeter, the outer perimeter contacting the structure so that the face occludes a flow of fluid through the passageway when the locator is proximate the first position, the metallic disc annulus being arranged with the central axis of the face being skewed from the longitudinal axis within the passageway when the locator is proximate the second position; and

a projection extending from the inner surface of the structure, the projection having a free end located in the passageway, the free end contacting the metallic disc annulus to translate the face of the annulus to a side of the longitudinal axis when the locator moves from the first position towards the second position.

157. (New) A dry sprinkler comprising: a tubular outer structure defining a passageway extending along a longitudinal axis between an inlet and an outlet;

a tubular inner assembly disposed within the tubular outer structure and movable along the longitudinal axis in the passageway between a first position and a second position, the tubular inner assembly including:

a multi-legged yoke, the multi-legged yoke having a first yoke support end and a second yoke support end, the first yoke support end including at least one elongate member, the second yoke support end including at least two support legs extending from the at least one elongate member; and

a fluid tube supporting the multi-legged yoke at one end of the fluid tube;

a closure assembly supported by the at least one elongate member of the first yoke support end, the closure assembly occluding a flow of fluid in the passageway when the tubular inner assembly is proximate the first position;

a projection coupled to the tubular outer structure, the projection extending in the passageway toward the longitudinal axis, the projection contacting the closure assembly to translate the closure assembly to a side of the longitudinal axis when the inner tubular assembly moves from the first position towards the second position;

a temperature responsive trigger assembly proximate the outlet of the tubular outer structure; and

a fluid deflecting structure proximate the outlet of the tubular outer structure.

158. (New) A sprinkler comprising:

a frame;

a trigger assembly mounted to said frame;

an outer structure assembly including an inlet and an outlet, the outlet being coupled to the frame;

a closure assembly disposed at the inlet of the outer structure assembly; and

an inner assembly extending between the trigger assembly and the closure assembly, wherein the inner assembly includes a support engaging the closure assembly and a

fluid tube engaging the support, and wherein the support and the fluid tube are slidable relative to the outer structure assembly.

159. (New) The sprinkler of claim 158, wherein the support is a multi-legged member.

160. (New) A sprinkler comprising:

- a frame;

- a trigger assembly mounted to said frame;

- an outer structure assembly including an inlet and an outlet spaced along a longitudinal axis, the outlet being coupled to the frame;

- a closure assembly disposed at the inlet of the outer structure assembly; and

- an inner assembly extending between the trigger assembly and the closure assembly; and

- a sleeve disposed within the outer structure assembly and including a projection extending toward the longitudinal axis for engaging the closure assembly when the trigger assembly is actuated.